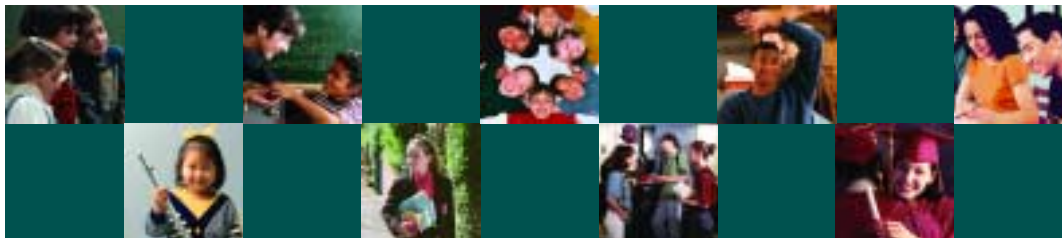


the condition of education 2002



INDICATOR 13

International Comparisons of 8th-Graders' Performance in Mathematics and Science

The indicator and corresponding tables are taken directly from *The Condition of Education 2002*. Therefore, the page numbers may not be sequential.

Additional information about the survey data and supplementary notes can be found in the full report. For a copy of *The Condition of Education 2002*, visit the NCES web site (<http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2002025>) or contact ED PUBs at 1-877-4ED-PUBS.

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NATIONAL CENTER FOR EDUCATION STATISTICS

U.S. Department of Education
Office of Educational Research and Improvement

Academic Outcomes

International Comparisons of 8th-Graders' Performance in Mathematics and Science

In 1999, U.S. 8th-graders exceeded the international average of 38 countries in mathematics and science but performed lower than their peers in 14 countries.

The Third International Mathematics and Science Study–Repeat (TIMSS-R), which was conducted in 1999, follows the previous TIMSS by 4 years and focuses on the mathematics and science achievement of 8th-graders in 38 countries.

Comparison of 8th-graders in 1999. In TIMSS-R, the international average score for 8th-graders in mathematics of the 38 participating countries was 487, and the average in science was 488. In 1999, U.S. students on average scored higher in both mathematics and science than the international average of the 38 countries. In mathematics, the average U.S. score was higher than the score in 17 countries, similar to the score in 6 countries, and lower than the score in 14 countries. In science, the average U.S. score for 8th-graders was higher than the score in 18 countries, similar to the score in 5 countries, and lower than the score in 14 countries in 1999 (see the figure on the opposite page and supplemental table 13-1).

Comparison of 8th-graders in 1995 and 1999. Both TIMSS and TIMSS-R assessed students in 8th grade, allowing for a comparison of 8th-grade performance at two points in time. Of the 38 countries that participated in TIMSS-R, 23 also participated in the 8th-grade assessment in TIMSS. The international average in 1999 of the 23 countries participating in both studies was 521 in both mathematics and science (see supplemental table 13-2).

Among U.S. 8th-graders, there was no statistically significant change in mathematics or science performance from 1995 to 1999. Of the 23 countries that participated at the 8th-grade level in mathematics in TIMSS 1995 and TIMSS-R 1999, there was no change in achievement in 19 countries during this period, 3 countries experienced an increase in overall mathematics achievement, and 1 country experienced a decrease. In science, there was no change in 18 of the 23 countries from 1995 to 1999, there was an increase in overall science achievement in 4 countries, and a decrease

in 1 country. The international average of 8th-graders in 1999 was similar to that of 8th-graders in 1995 in both mathematics and science for the 23 countries that participated in both assessments (see the top figure on page 62 and supplemental table 13-2).

Comparison of 4th-graders in 1995 and 8th-graders in 1999. The 1995 TIMSS 4th-graders and the 1999 TIMSS-R 8th-graders represented the same cohort of students at two different points in time. These students' performance in 1995 can be compared with their performance in 1999. However, direct comparisons between the 1995 4th-grade TIMSS assessment and the 1999 8th-grade TIMSS-R assessment are complicated by several factors, including differences in the content areas assessed and the questions that could be asked between the two grade levels. Therefore, comparisons between TIMSS 4th-graders and TIMSS-R 8th-graders are based on their performance relative to the international average of the 17 countries that participated in 4th-grade TIMSS in 1995 and 8th-grade TIMSS-R in 1999. The international average in 1999 for the 17 countries was 524 in both 8th-grade mathematics and science in 1999 and it was 517 and 514 in 4th-grade mathematics and science, respectively, in 1995 (see supplemental table 13-3).

The U.S. mathematics score for 4th-graders in 1995 was statistically similar to the international average of the 17 participating countries, but the U.S. mathematics score for 8th-graders in 1999 was below the international average. In science, the U.S. 4th-grade score in 1995 was above the international average of the 17 countries, but the 8th-grade score in 1999 was similar to the international average. As a result, in both mathematics and science, U.S. students' performance decreased relative to the international average of the 17 countries, from the 4th grade in 1995 to the 8th grade in 1999 (see the bottom figure on page 62 and supplemental table 13-3).

MATHEMATICS AND SCIENCE PERFORMANCE: Average mathematics and science performance of 8th-graders for the 38 participating countries: 1999

Mathematics	Average score relative to the United States	Science
Australia Belgium-Flemish Canada Chinese Taipei Finland Hong Kong, SAR Hungary Japan Korea, Republic of Netherlands Russian Federation Singapore Slovak Republic Slovenia	Significantly higher	Australia Belgium-Flemish Canada Chinese Taipei Czech Republic England Finland Hungary Japan Korea, Republic of Netherlands Singapore Slovak Republic Slovenia
Bulgaria Czech Republic England Latvia-LSS ¹ Malaysia New Zealand	Not significantly different	Bulgaria Hong Kong, SAR Latvia-LSS ¹ New Zealand Russian Federation
Chile Cyprus Indonesia <i>International average</i> Iran, Islamic Republic of Israel ² Italy Jordan Lithuania ³ Macedonia, Republic of Moldova Morocco Philippines Romania South Africa Thailand Tunisia Turkey	Significantly lower	Chile Cyprus Indonesia <i>International average</i> Iran, Islamic Republic of Israel ² Italy Jordan Lithuania ³ Macedonia, Republic of Malaysia Moldova Morocco Philippines Romania South Africa Thailand Tunisia Turkey

¹Only Latvian-speaking schools were tested.

²Israel did not meet the international sampling and/or other guidelines. See *Supplemental Note 4* for details.

³Lithuania tested the same cohort of students as in other countries, but later in 1999, at the beginning of the next school year.

NOTE: Eighth grade in most countries. See *Supplemental Note 4* for details. The international average is the average of the national averages of the 38 countries.

SOURCE: U.S. Department of Education, NCES. (2000). *Pursuing Excellence: Comparisons of International Eighth-Grade Mathematics and Science Achievement from a U.S. Perspective, 1995 and 1999* (NCES 2001–028) (TIMSS-R).



FOR MORE INFORMATION:

Supplemental Note 4

Supplemental Tables 13-1, 13-2, 13-3

NCES 2001–027, NCES 2000–062, Indicators 18, 19

CHANGE IN MATHEMATICS AND SCIENCE PERFORMANCE: Mathematics and science performance of 8th-graders in 1995 and 1999 for the 23 countries that participated in both assessments

Mathematics	Average score in 1999 relative to the country's score in 1995	Science
Canada Cyprus Latvia-LSS ^{1,2}	Significantly higher	Canada Hungary Latvia-LSS ^{1,2} Lithuania ^{1,3}
Australia ¹ Belgium-Flemish Bulgaria ¹ England ¹ Hong Kong, SAR Hungary International average Iran, Islamic Republic of Italy Japan Korea, Republic of Lithuania ^{1,3} Netherlands ¹ New Zealand Romania ¹ Russian Federation Singapore Slovak Republic Slovenia ¹ United States	Not significantly different	Australia ¹ Belgium-Flemish Cyprus Czech Republic England ¹ Hong Kong SAR International average Iran, Islamic Republic of Italy Japan Korea, Republic of Netherlands ¹ New Zealand Romania ¹ Russian Federation Singapore Slovak Republic Slovenia ¹ United States
Czech Republic	Significantly lower	Bulgaria ¹

MATHEMATICS PERFORMANCE: Average mathematics performance of 4th-graders in 1995 and 8th-graders in 1999 for the 17 countries that participated in both assessments

4 th -graders in 1995	Average score relative to the international average	8 th -graders in 1999
Czech Republic Japan Hong Kong, SAR Netherlands ¹ Korea, Republic of Singapore	Significantly higher	Hong Kong, SAR Singapore Japan Korea, Republic of
Australia ¹ Hungary ¹ Italy ¹ Slovenia ¹ United States	Not significantly different	Australia Hungary Canada Netherlands Czech Republic Slovenia
Canada Cyprus England ¹ Iran, Islamic Republic of Latvia-LSS ^{1,2} New Zealand	Significantly lower	Cyprus England Iran, Islamic Republic of Italy Latvia-LSS ² New Zealand United States

¹Country did not meet the international sampling and/or other guidelines at 8th-grade level in 1995. See *Supplemental Note 4* for more details.

²Only Latvian-speaking schools were tested.

³Lithuania tested the same cohort of students as in other countries, but later in 1999, at the beginning of the next school year.

NOTE: Eighth grade in most countries. See *Supplemental Note 4* for details. International average is the average of the national averages for the 23 countries that participated in the 8th-grade assessment in both 1995 and 1999.

SOURCE: U.S. Department of Education, NCES. (2000). *Pursuing Excellence: Comparisons of International Eighth-Grade Mathematics and Science Achievement from a U.S. Perspective, 1995 and 1999* (NCES 2001–028) (TIMSS and TIMSS-R).

¹Country did not meet the international sampling and/or other guidelines at 4th-grade level in 1995. See *Supplemental Note 4* for more details.

²Only Latvian-speaking schools were tested.

NOTE: Fourth and 8th grade in most countries. See *Supplemental Note 4* for details. International average is the average of the national averages for the 17 countries that participated in the 4th-grade assessment in 1995 and the 8th-grade assessment in 1999.

SOURCE: U.S. Department of Education, NCES. (2000). *Pursuing Excellence: Comparisons of International Eighth-Grade Mathematics and Science Achievement from a U.S. Perspective, 1995 and 1999* (NCES 2001–028) (TIMSS and TIMSS-R).

FOR MORE INFORMATION:

Supplemental Note 4

Supplemental Tables 13-1, 13-2, 13-3

NCES 2001–027, NCES 2000–062, Indicators 18, 19



International Comparisons of 8th-Graders' Performance in Mathematics and Science

Table 13-1 Average mathematics and science performance of 8th-graders for the 38 participating countries, by sex and country: 1999

Country	Mathematics: mean score			Science: mean score		
	Total	Male	Female	Total	Male	Female
International average	487	489	485	488	495	480
Australia	525	526	524	540	549	532
Belgium-Flemish	558	556	560	535	544	526
Bulgaria	511	511	510	518	525	511
Canada	531	533	529	533	*540	526
Chile	392	397	388	420	*432	409
Chinese Taipei	585	587	583	569	*578	561
Cyprus	476	474	479	460	465	455
Czech Republic	520	*528	512	539	*557	523
England	496	505	487	538	*554	522
Finland	520	522	519	535	540	530
Hong Kong SAR	582	581	583	530	537	522
Hungary	532	535	529	552	*565	540
Indonesia	403	405	401	435	444	427
Iran, Islamic Republic of	422	*432	408	448	*461	430
Israel ¹	466	*474	459	468	476	461
Italy	479	484	475	493	503	484
Japan	579	582	575	550	556	543
Jordan	428	425	431	450	442	460
Korea, Republic of	587	590	585	549	*559	538
Latvia-LSS ²	505	508	502	503	*510	495
Lithuania ³	482	483	480	488	*499	478
Macedonia, Republic of	447	447	446	458	458	458
Malaysia	519	517	521	492	498	488
Moldova	469	471	468	459	465	454
Morocco	337	344	326	323	330	312
Netherlands	540	542	538	545	*554	536
New Zealand	491	487	495	510	513	506
Philippines	345	337	352	345	339	351
Romania	472	470	475	472	475	468
Russian Federation	526	526	526	529	*540	519
Singapore	604	606	603	568	578	557
Slovak Republic	534	536	532	535	*546	525
Slovenia	530	531	529	533	*540	527
South Africa	275	283	267	243	253	234
Thailand	467	465	469	482	484	481
Tunisia	448	*460	436	430	*442	417
Turkey	429	429	428	433	434	431
United States	502	505	498	515	*524	505

*The average male score for this country is significantly different from the average female score for this country.

¹Did not meet international sampling and/or other guidelines. See *Supplemental Note 4* for details.

²Only Latvian-speaking schools were tested.

³Lithuania tested the same cohort of students as in other countries, but later in 1999, at the beginning of the next school year.

NOTE: Eighth grade in most countries. See *Supplemental Note 4* for details. The international average is the average of the national average of the 38 countries.

SOURCE: U.S. Department of Education, NCES. (2000). *Pursuing Excellence: Comparisons of International Eighth-Grade Mathematics and Science Achievement from a U.S. Perspective, 1995 and 1999* (NCES 2001-028) (TIMSS-R).

International Comparisons of 8th-Graders' Performance in Mathematics and Science

Table 13-2 Average mathematics and science performance of 8th-graders for the 23 countries that participated in both assessments, by country: 1995 and 1999

Country	Mathematics: mean score			Science: mean score		
	1995	1999	1995–99 difference ¹	1995	1999	1995–99 difference ¹
International average	519	521	2	518	521	3
Australia ²	519	525	6	527	540	14
Belgium-Flemish	550	558	8	533	535	2
Bulgaria ²	527	511	-16	545	518	*-27
Canada	521	531	*10	514	533	*19
Cyprus	468	476	*9	452	460	8
Czech Republic	546	520	*-26	555	539	-16
England ²	498	496	-1	533	538	5
Hong Kong SAR	569	582	13	510	530	20
Hungary	527	532	5	537	552	*16
Iran, Islamic Republic of	418	422	4	463	448	-15
Italy	491	485	-6	497	498	1
Japan	581	579	-2	554	550	-5
Korea, Republic of	581	587	6	546	549	3
Latvia-LSS ^{2,3}	488	505	*17	476	503	*27
Lithuania ^{2,4}	472	482	10	464	488	*25
Netherlands ²	529	540	11	541	545	3
New Zealand	501	491	-10	511	510	-1
Romania ²	474	472	-1	471	472	1
Russian Federation	524	526	2	523	529	7
Singapore	609	604	-4	580	568	-12
Slovak Republic	534	534	0	532	535	3
Slovenia ²	531	530	-1	541	533	-8
United States	492	502	9	513	515	2

*1999 average is statistically different from the 1995 average.

¹Difference is calculated by subtracting the 1995 score from the 1999 score. Details may not sum due to rounding.

²Did not meet international sampling and/or other guidelines in 1995, 1999, or both years. See *Supplemental Note 4* for details.

³Only Latvian-speaking schools were tested.

⁴Lithuania tested the same cohort of students as in other countries, but later in 1999, at the beginning of the next school year.

NOTE: Eighth grade in most countries. See *Supplemental Note 4* for details. International average is the average of the national averages of the 23 countries. Scores for 1995 are based on rescaled data.

SOURCE: U.S. Department of Education, NCES. (2000). *Pursuing Excellence: Comparisons of International Eighth-Grade Mathematics and Science Achievement from a U.S. Perspective, 1995 and 1999* (NCES 2001–028) (TIMSS and TIMSS-R).

International Comparisons of 8th-Graders' Performance in Mathematics and Science

Table 13-3 Score difference from the international average for the 17 participating countries, by mathematics and science performance of 4th-graders in 1995 and 8th-graders in 1999

Country	Mathematics		Science	
	4 th -graders in 1995	8 th -graders in 1999	4 th -graders in 1995	8 th -graders in 1999
International average	517	524	514	524
Australia ¹	0	1	*28	*16
Canada	*-12	7	*12	*9
Cyprus	*-42	*-48	*-64	*-64
Czech Republic	*23	-4	*18	*15
England ¹	*-33	*-28	*14	*14
Hong Kong SAR	*40	*58	-6	5
Hungary ¹	4	8	-6	*28
Iran, Islamic Republic of	*-130	*-102	*-134	*-76
Italy ¹	-7	*-39	10	*-26
Japan	*50	*55	*39	*25
Korea, Republic of	*63	*63	*62	*24
Latvia-LSS ^{1,2}	*-18	*-19	*-27	*-21
Netherlands ¹	*32	16	*17	*21
New Zealand	*-48	*-33	-9	*-15
Singapore	*73	*80	10	*44
Slovenia ¹	8	6	8	9
United States	0	*-22	*28	-9

*The average score for this country is significantly different from the international average for the indicated year.

¹Did not meet international sampling and/or other guidelines for 4th grade in 1995. See *Supplemental Note 4* for details.

²Only Latvian-speaking schools were tested.

NOTE: Fourth and 8th grade in most countries. See *Supplemental Note 4* for details. International average is the average of the national averages of the 17 countries. Scores for 1995 are based on rescaled data.

SOURCE: U.S. Department of Education, NCES. (2000). *Pursuing Excellence: Comparisons of International Eighth-Grade Mathematics and Science Achievement from a U.S. Perspective, 1995 and 1999* (NCES 2001-028) (TIMSS and TIMSS-R).

International Comparisons of 8th-Graders' Performance in Mathematics and Science

Table S13-1 Standard errors for the average mathematics and science performance of 8th-graders for the 38 participating countries, by sex and country: 1999

Country	Mathematics: mean score			Science: mean score		
	Total	Male	Female	Total	Male	Female
International average	0.7	0.9	0.8	0.7	0.9	0.9
Australia	4.8	5.7	5.7	4.4	6.0	5.1
Belgium-Flemish	3.3	8.3	7.2	3.1	7.2	4.7
Bulgaria	5.9	6.9	5.9	5.4	6.5	5.8
Canada	2.5	3.2	2.5	2.1	2.4	3.2
Chile	4.4	5.8	4.3	3.7	5.1	4.3
Chinese Taipei	4.0	5.3	3.9	4.4	5.7	3.9
Cyprus	1.8	2.7	2.1	2.4	3.0	3.1
Czech Republic	4.2	5.8	4.0	4.2	4.9	4.8
England	4.2	5.0	5.4	4.8	5.3	6.2
Finland	2.7	3.5	3.0	3.5	4.5	4.0
Hong Kong SAR	4.3	5.9	4.7	3.7	5.1	4.4
Hungary	3.7	4.3	4.0	3.7	4.5	4.0
Indonesia	4.9	5.0	5.4	4.5	4.8	6.5
Iran, Islamic Republic of	3.4	4.8	4.2	3.8	4.4	5.7
Israel	3.9	4.8	4.2	4.9	5.5	6.0
Italy	3.8	4.3	4.5	3.9	5.6	4.1
Japan	1.7	2.3	2.4	2.2	3.6	2.8
Jordan	3.6	5.9	4.7	3.8	5.9	5.0
Korea, Republic of	2.0	2.2	3.1	2.6	3.2	4.0
Latvia-LSS	3.4	4.4	3.8	4.8	4.8	5.6
Lithuania	4.3	4.8	4.7	4.1	5.0	4.4
Macedonia, Republic of	4.2	4.3	5.3	5.2	5.4	6.0
Malaysia	4.4	6.0	4.7	4.4	5.8	5.5
Moldova	3.9	4.7	4.1	4.0	5.4	4.4
Morocco	2.6	4.1	5.3	4.3	5.9	5.9
Netherlands	7.1	7.0	7.6	6.9	7.3	7.1
New Zealand	5.2	7.6	5.5	4.9	7.0	5.4
Philippines	6.0	6.5	6.9	7.5	8.9	8.2
Romania	5.8	6.2	6.3	5.8	6.5	6.4
Russian Federation	5.9	6.4	6.0	6.4	6.2	7.1
Singapore	6.3	7.5	6.1	8.0	9.7	7.9
Slovak Republic	4.0	4.5	4.2	3.3	4.5	3.4
Slovenia	2.8	3.6	3.0	3.2	3.7	3.7
South Africa	6.8	7.3	7.5	7.9	7.7	9.2
Thailand	5.1	5.5	5.7	4.0	4.4	4.6
Tunisia	2.4	2.9	2.4	3.4	4.3	3.3
Turkey	4.3	4.4	4.7	4.3	4.3	4.8
United States	4.0	4.8	3.9	4.6	5.5	4.6

SOURCE: U.S. Department of Education, NCES. (2000). *Pursuing Excellence: Comparisons of International Eighth-Grade Mathematics and Science Achievement from a U.S. Perspective, 1995 and 1999* (NCES 2001-028) (TIMSS-R).

International Comparisons of 8th-Graders' Performance in Mathematics and Science

Table S13-2 Standard errors for the average mathematics and science performance of 8th-graders for the 23 countries that participated in both assessments, by country: 1995 and 1999

Country	Mathematics: mean score			Science: mean score		
	1995	1999	1995-99 difference	1995	1999	1995-99 difference
International average	0.9	0.9	1.3	0.9	0.9	1.3
Australia	3.8	4.8	6.1	4.0	4.4	6.0
Belgium-Flemish	5.9	3.3	6.8	6.4	3.1	7.1
Bulgaria	5.8	5.9	8.2	5.2	5.4	7.5
Canada	2.2	2.5	3.2	2.6	2.1	3.3
Cyprus	2.2	1.8	2.9	2.1	2.4	3.3
Czech Republic	4.5	4.2	6.1	4.5	4.2	6.1
England	3.0	4.2	5.2	3.6	4.8	5.8
Hong Kong SAR	6.1	4.3	7.5	5.8	3.7	6.8
Hungary	3.2	3.7	4.9	3.1	3.7	4.9
Iran, Islamic Republic of	3.9	3.4	5.2	3.6	3.8	5.2
Italy	3.4	4.8	6.0	3.6	4.8	5.9
Japan	1.6	1.7	2.2	1.8	2.2	3.0
Korea, Republic of	2.0	2.0	2.8	2.0	2.6	3.4
Latvia-LSS	3.6	3.4	5.0	3.3	4.8	5.9
Lithuania	4.1	4.3	6.1	4.0	4.1	5.7
Netherlands	6.1	7.1	9.5	6.0	6.9	9.1
New Zealand	4.7	5.2	7.1	4.9	4.9	6.9
Romania	4.6	5.8	7.4	5.1	5.8	7.8
Russian Federation	5.3	5.9	8.0	4.5	6.4	7.9
Singapore	4.0	6.3	7.4	5.5	8.0	9.8
Slovak Republic	3.1	4.0	4.9	3.3	3.3	4.5
Slovenia	2.8	2.8	3.9	2.8	3.2	4.4
United States	4.7	4.0	6.2	5.6	4.6	7.2

SOURCE: U.S. Department of Education, NCES. (2000). *Pursuing Excellence: Comparisons of International Eighth-Grade Mathematics and Science Achievement from a U.S. Perspective, 1995 and 1999* (NCES 2001-028) (TIMSS and TIMSS-R).

International Comparisons of 8th-Graders' Performance in Mathematics and Science

Table S13-3 Standard errors for the score difference from the international average for the 17 participating countries, by mathematics and science performance of 4th-graders in 1995 and 8th-graders in 1999

Country	Mathematics		Science	
	4 th -graders in 1995	8 th -graders in 1999	4 th -graders in 1995	8 th -graders in 1999
International average	0.9	1.0	0.9	1.1
Australia	3.0	4.7	3.5	4.3
Canada	3.3	2.7	3.0	2.1
Cyprus	3.1	1.9	3.1	2.3
Czech Republic	3.1	4.1	3.0	4.1
England	3.3	4.0	3.1	4.5
Hong Kong SAR	3.8	4.2	3.3	3.5
Hungary	3.5	3.6	3.3	3.6
Iran, Islamic Republic of	4.8	3.3	4.4	3.7
Italy	4.5	4.6	4.4	4.5
Japan	2.0	1.8	1.9	2.4
Korea, Republic of	1.9	2.0	2.2	2.6
Latvia-LSS	4.4	3.3	4.7	4.9
Netherlands	2.9	6.8	3.1	6.5
New Zealand	4.2	4.9	5.1	4.8
Singapore	4.3	5.9	4.6	7.6
Slovenia	3.1	2.8	3.9	3.3
United States	2.9	3.8	3.2	4.5

SOURCE: U.S. Department of Education, NCES. (2000). *Pursuing Excellence: Comparisons of International Eighth-Grade Mathematics and Science Achievement from a U.S. Perspective, 1995 and 1999* (NCES 2001-028) (TIMSS and TIMSS-R).